

ITEM FOR FINANCE COMMITTEE

CAPITAL WORKS RESERVE FUND

HEAD 710 - COMPUTERISATION

Census and Statistics Department

New Subhead “Computer Equipment and Services for the 2016 Population By-census”

Members are invited to approve a new commitment of \$88,814,000 for acquiring computer equipment and services for the 2016 Population By-census.

PROBLEM

The computer system developed for the 2011 Population Census (11C) in the Census and Statistics Department (C&SD) is inadequate to support the fieldwork operation and data processing work of the 2016 Population By-census (16BC).

PROPOSAL

2. The Commissioner for Census and Statistics, with the support of the Secretary for Financial Services and the Treasury and the Government Chief Information Officer, proposes to acquire computer equipment and services for making adaptation and enhancement to the 11C computer system for handling the work of the 16BC, and to develop a new Mobile Questionnaire Application and Administrative sub-system to support the use of mobile devices in field operation.

JUSTIFICATION

Computer Support for the 16BC

3. The 16BC involves the conduct of a detailed enquiry on about one-tenth of households, using a long form questionnaire covering questions in

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over 40 data topics. It is a large-scale and complex operation involving the recruitment and training of some 6 500 temporary enumerators; the enumeration of about 300 000 households during the 34-day data collection period (tentatively scheduled for 30 June to 2 August 2016); the processing of completed questionnaires within a short period of time; and the dissemination of results in batches from February 2017. With reference to the experience in past population censuses/by-censuses, the support of a tailored computer system is essential for conducting the exercise in a cost-effective way.

4. In the 16BC, a two-phase data collection approach using advanced information technology will be adopted. In the first phase, households will be provided with the self-enumeration option to submit e-Questionnaires via the Internet through personal desktop computers or mobile devices. For those households who do not respond in the first phase, enumerators will collect the required data by face-to-face interviews using a new paperless computer-assisted interviewing (CAI) method. Under the CAI approach, enumerators will make use of mobile devices to record the collected data instead of paper questionnaires. An integrated computer system is therefore needed to support the new CAI and streamline the multi-modal data collection and subsequent processing work.

5. In 2013, C&SD commissioned a feasibility study to examine the technical requirements and financial implications of the proposed computer system. A Business Process Re-engineering (BPR) study was also conducted to identify opportunities for streamlining and improving the workflow of the 16BC.

Constraints of the 11C Computer System and Proposed Computer System for the 16BC

6. The feasibility cum BPR study, which was completed in end December 2013, proposes to “upgrade, enhance and reuse” the computer system developed for the 11C as far as practicable, despite that most of the computer equipment used in the 11C have either been re-deployed (as planned) for use in other computer projects of C&SD or are due for replacement. In addition, the study also recognises the need for enhancement and new functionalities to meet the changing requirements of the 16BC, in particular the adoption of the new CAI data collection method. The study therefore recommends that the 16BC computer system should be established using a combination approach involving enhancement of 17 sub-systems and overhaul of one sub-system of the 11C and development of one new sub-system. This combination approach represents the most cost-effective solution in developing a tailored computer system for the 16BC.

New Functions of the 16BC Computer System

7. To provide better services to the public and to improve the efficiency of the 16BC operation, the following key new functions/features will be added to the proposed computer system –

(a) *Paperless data collection*

During face-to-face interviews, enumerators will use mobile devices (instead of paper questionnaires) to record the collected data. The data will be uploaded to the centralised computer system simultaneously, thereby greatly shortening the time required for data collection, capturing and integration. Apart from being more environmentally friendly, this approach could further streamline the subsequent processing steps.

(b) *Increasing efficiency in fieldwork support*

Enumerators can access fieldwork materials including location maps, up-to-date assignment lists and work manuals via the mobile devices, thereby increasing operational efficiency and reducing paper consumption. With the aid of mobile devices, message/information can also be efficiently disseminated to all or part of the enumerators at any time.

(c) *Streamlining the distribution of workload to enumerators*

The assignment allocation function will take into account the latest e-Questionnaire responses and support timely re-allocation of outstanding assignments among different enumerators through their mobile devices. This flexible assignment allocation mechanism can help achieve a more even distribution of workload and enhance overall fieldwork progress.

(d) *Better fieldwork progress monitoring*

The fieldwork progress of individual enumerators will be captured automatically by mobile devices instead of manual input on a daily basis. Enumeration progress can be more closely monitored to allow timely follow-up on unsuccessful cases.

(e) *Enhancing data sharing among sub-systems*

The system will enable more timely data sharing among different sub-systems during day time instead of through batch updating at each day end. This will be achievable as vast majority of the data

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will be collected online through the streamlined workflow resulting from mobile computing. It also facilitates the handling of public enquiries by indoor officers with more up-to-date information.

(f) Enhancing data quality

On-the-spot data validation checks will be incorporated on the mobile devices of enumerators. It enables early detection of reporting errors and clarification with the respondents instantly. The turnaround time for conducting sample check on completed questionnaires will be shortened as a result of the automation in data collection. It is possible to conduct prompt follow-up face-to-face clarification interviews if necessary.

(g) Improving data security

Data collected in mobile devices will be removed once uploaded. In case of loss of device, the transient data in the devices will be protected by encryption and can be wiped out through remote control.

Cost and Benefit Analysis

8. Given the large scale and complex operation of the 16BC, it is necessary to have an efficient computer system to support the conduct of the population by-census. The proposed system will be critical to the smooth conduct of the 16BC and hence the production of good quality statistics for use by a large number of users in both the public and private sectors.

9. The proposed 16BC computer system is designed to meet all the operational, timing and data quality requirements of the 16BC. It is designed using a combination approach as explained in paragraph 6 above to maximise cost-effectiveness. Besides, with the implementation of the new CAI data collection method as proposed, cost avoidance of \$9.371 million on additional posts, computer equipment and services as well as logistic overheads will be achieved.

10. Apart from the intangible benefits as explained in paragraph 7 above, adoption of the paperless data collection approach will also help maintain the image of Hong Kong as an Information and Communications Technology advanced and statistically advanced economy, and promote the eco-friendly image of the government.

/Future

Future Use of the 16BC Computer System

11. To maximise the benefits arising from the acquisition of the computer system for the 16BC, the following enhanced sub-systems will be retained for use beyond the 16BC operation –

- (a) Register of Quarters Sub-system – to facilitate continuous updating of a complete list of quarters and building details in Hong Kong which serves as the sampling frame for other household surveys and future population censuses/by-censuses;
- (b) Sampling Sub-system – for sample selection for other household surveys and future population censuses/by-censuses;
- (c) Digital Mapping Sub-system – for maintaining digital maps for supporting other household surveys and population censuses/by-censuses;
- (d) Statistics Dissemination Sub-system – for on-going dissemination of 16BC results for various planning and analytical uses; and
- (e) Interactive Data Dissemination Sub-system – for on-going interactive tabulations of 16BC results by the public.

12. As in the past, we will re-deploy the equipment and facilities of the rest of the sub-systems of the 16BC, including the mobile devices for data collection, to meet other operational needs in the C&SD where appropriate after the completion of the 16BC, with a view to maximising the utilisation of resources available. Any surplus serviceable equipment will then be re-deployed to other departments or donated to non-government organisations following the established procedures of the government. We will also reuse the sub-systems in the 2021 Population Census as far as possible taking into account the business and operational requirements then.

FINANCIAL IMPLICATIONS

Non-recurrent Expenditure

13. We estimate that implementation of the proposal will incur a non-recurrent cost of \$88.814 million over a five-year period from 2014-15 to 2018-19 for the acquisition of computer hardware, software and related services. Detailed breakdown is as follows –

	2014-15	2015-16	2016-17	2017-18	2018-19	Total
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
(a) Hardware	7,834	19,963	1,166	854	887	30,704
(b) Software	3,300	1,941	698	295	200	6,434
(c) Site preparation	212	-	-	-	-	212
(d) Implementation services	307	5,495	9,875	2,645	59	18,381
(e) Contract staff	4,730	11,658	7,982	1,391	-	25,761
(f) Miscellaneous	842	149	2,369	67	70	3,497
(g) Contingency	775	1,764	994	237	55	3,825
Total	18,000	40,970	23,084	5,489	1,271	88,814

14. On paragraph 13(a) and 13(b) above, the estimates of \$30,704,000 and \$6,434,000 are for the acquisition of computer hardware and software respectively. The hardware will include about 30 computer servers and storage systems, about 440 personal computer workstations, some 6 000 mobile tablets, peripherals, network equipment and data communication facilities. The software will include operating systems, database management systems, mobile device management systems and application development tools, etc.

15. On paragraph 13(c) above, the estimate of \$212,000 is for site preparation in respect of cabling work for server room and office area in 16BC Office.

16. On paragraph 13(d) above, the estimate of \$18,381,000 is for hiring services for system development and customisation, equipment installation and system configuration, Internet system hosting services, and security auditing services.

17. On paragraph 13(e) above, the estimate of \$25,761,000 is for hiring contract staff for the system implementation work, including implementing system enhancement, providing support during rehearsal and production run and steering the implementation services by contractors.

18. On paragraph 13(f) above, the estimate of \$3,497,000 is to meet miscellaneous expenditure including rental of data communication link, acquisition of mobile data services, consumables and staff training.

19. On paragraph 13(g) above, the estimate of \$3,825,000 represents a 4.5% contingency on the items set out in paragraphs 13(a) to (f) above.

Other non-recurrent Expenditure

20. The proposed implementation of the project will entail non-recurrent staff cost of \$5,720,000 for the creation of one time-limited civil service Senior Systems Manager post from April 2014 to July 2017. The post will be responsible for overall project planning and monitoring, risk management, technical advisory as well as contract management.

21. The above non-recurrent staff cost will be absorbed by C&SD. The cost breakdown by years is as follows –

	2014-15	2015-16	2016-17	2017-18	2018-19	Total
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
Staff Cost	1,716	1,716	1,716	572	-	5,720
Total	1,716	1,716	1,716	572	-	5,720

Recurrent Expenditure

22. The cost required for maintaining the computer equipment during the five-year project period from 2014-15 to 2018-19 has been included in the non-recurrent expenditure of the project. The recurrent cost of \$1,074,000 beyond the project period from 2019-20 onwards will be absorbed by C&SD. It comprises the annual maintenance cost of the retained hardware equipment at an estimated amount of \$838,000 as well as the annual Internet system hosting service charge at \$236,000.

IMPLEMENTATION PLAN

23. Subject to approval of funding, we plan to adopt the following implementation schedule –

/Major

Major Activities	Target Completion Date
(a) Phase I (Rehearsal)	
- Equipment and Services Procurement	March 2015
- System Design, Development/Enhancement and User Acceptance Test of Key Sub-systems Supporting Pre-survey Preparation and Field Operation	June 2015
- Rehearsal	August 2015
(b) Phase II (By-census Operation and Data Dissemination Stage 1)	
- Equipment and Services Procurement	March 2016
- Refinement of Phase I Sub-systems	June 2016
- System Design, Enhancement and User Acceptance Test of Other Sub-systems Supporting Pre-survey Preparation and Field Operation	June 2016
- By-census Field Operation	August 2016
- System Design, Enhancement and User Acceptance Test of Sub-systems Supporting Data Processing and Dissemination of Summary Results	September 2016
- Data Processing and Dissemination of Summary Results	February 2017
(c) Phase III (Data Dissemination Stage 2)	
- Implementation of e-service for Interactive Data Dissemination	September 2017
- Dissemination of Other By-census Results	March 2018
(d) Post Implementation Support	September 2018

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PUBLIC CONSULTATION

24. On 2 December 2013, we briefed the Legislative Council Panel on Financial Affairs on our planning work for the proposed 16BC and the estimated funding required for computer systems and services. The Panel supported the proposal.

BACKGROUND

25. C&SD conducted population censuses in 10-year intervals, i.e. 1961, 1971, 1981, 1991, 2001 and 2011; and population by-censuses were conducted in the middle of the intercensal period, i.e. 1966, 1976, 1986, 1996 and 2006. Following this practice, C&SD will conduct the next population by-census in 2016.

26. The aim of conducting population censuses/by-censuses is to obtain up-to-date benchmark information on the socio-economic characteristics of the population and on its geographical distribution. They provide benchmark data for studying the direction and trend of population changes. The data are key inputs for making projections concerning population, household, labour force and employment as well as major reference for formulating various population-related policies.

27. Population censuses involve a complete headcount of the population, while population by-censuses enquire about the detailed characteristics of the population on the basis of a large sample. The size and characteristics of the entire population are inferred from the sample results in accordance with statistical theories. The sizable scale of a population by-census, as compared to other general sample household surveys, can provide statistics of high precision even for population sub-groups and small geographical areas. Such information is vital to Government for planning and policy formulation, as well as to the private sector and academia for business and research purposes.

28. On 19 June 2009, FC approved \$85,273,000 (vide FCR(2009-10)21) for acquiring computer equipment and services for the 11C.
